ICT Update

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CTA

LIVESTOCK

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The livestock revolution and ICTs

Over the last decade the growing global demand for livestock products has given rise to a real 'livestock revolution'. In many developing countries the livestock industry is expanding faster than any other agricultural sector. In order to address the environmental, health and economic challenges posed by this revolution, governments, NGOs and individual farmers need both comprehensive, up-to-date information resources and clearly defined policies and regulations agreed upon by the international community. This issue of *ICT Update* reports on a number of initiatives to assess how ICTs may help meet these needs.

ICTs are being used in several ways to facilitate compliance with international regulations that aim to combat the spread of animal diseases, and address food safety and other public health concerns. Current EU regulations stipulate that imported livestock products must be traceable from the packing plant back to the individual animals and farms in the country of origin. Those regulations are based on the findings of the IDEA project, outlined by Christophe Korn, which assessed the feasibility and effectiveness of electronic animal identification systems. Tinus Burger then describes the Livestock Identification Trace-back System (LITS) project in Botswana, which has installed radio frequency identification (RFID) technology to identify and monitor millions of beef cattle destined for export to Europe. Focusing on an equally valuable approach in the Pacific region, Alexandre Fediaevsky reports on the Pacific Animal Health Information System (PAHIS), a database and decision support system issued on CD-ROM. Veterinary officers throughout the region now have access to the information they need to carry out risk analyses.

ICTs are potentially important tools for improving livestock management, and protecting environmental resources such as grazing land and water supplies. Alioune Kâ describes the innovative 'Cyber Shepherd' project in the Sahel, where pastoralist livestock herders are learning to address the problems of increasing drought and overgrazing using GPS devices and GIS mapping to monitor and manage their livestock movements.

Finally, ICTs are helping small-scale farmers to play a role in the increasingly integrated livestock production and marketing chain. Animesh Rathore writes about the Dairy Information System Kiosk (DISK) initiative in India, which has introduced 'smart cards' to help farmers improve their dairy herds and the quality and quantity of their milk. Frans Naudé then explains how the ARC Animal Improvement Institute (AII) in South Africa is using a wide range of ICTs in its schemes to assist farmers in improving their livestock.

The six initiatives described in this issue are just a few of the inspiring advances being made in the use ICTs for development. They demonstrate that ICTs are playing a vital role in the livestock revolution and in enabling all those involved, from farmer to retailer, to improve the quality and quantity of livestock products and reduce the risk of potentially harmful side effects.

Livestock identification

Following the recent outbreaks of foot and mouth disease in Europe, the identification and registration of individual animals has become an essential element of the EU's livestock management programme. The European Council is now actively promoting the use of ICTs to support this programme, which aims to identify a feasible system for ensuring the traceability of all animal products consumed in Europe from birth to slaughterhouse.

As long ago as 1994 the Council initiated a series of projects to examine the feasibility of electronic identification systems for livestock. Following a successful pilot study, commissioned under the European Agricultural Guarantee and Guidance Fund (EAGGF), a second project (1995–1998) involving 20,000 cattle, sheep and goats confirmed the feasibility of electronic identification under farm conditions, and indicated that it would be significantly less expensive than plastic ear tagging or tattoos.

The European Commission then approved a larger-scale project, called IDEA (Identification Electronique des Animaux). From 1998 to 2001, one million farm animals were electronically identified, involving more than 6000 farms and 70 slaughterhouses in six EU countries. The project examined the performance of three electronic tagging systems – ear tags, the stomach bolus and injectable transponders – for cattle, buffaloes, sheep and goats. It also evaluated the organizational structure needed to implement such a system. [databases?]

The IDEA project showed that electronic identification devices are far more effective than traditional systems, and would improve livestock identification, registration and management systems for cattle, buffalo, sheep and goats. Based on the final report of the IDEA project, the Commission submitted a draft proposal for a Council regulation: 'Establishing a system for the identification and registration of ovine and caprine animals' (COM(2002)729). This regulation seeks to establish a mechanism for the permanent tagging of sheep and goats throughout Europe. This is a first legislative step towards the adoption of electronic identification for all farm animals [including cattle?]

Similar projects are now under way in other countries, most notably in Africa. In Botswana, for example, the Ministry of Agriculture has introduced the Livestock Identification Trace-back System (LITS) for the identification of millions of cattle (see elsewhere in this issue). This project has been set up by ministry officials and experts who participated in the IDEA project in order to develop an approach suitable for field conditions in Botswana and complying with EU legislation on animal identification and registration. <How is the EU/IDEA currently involved in the Botswana Ministry of Agriculture initiative and will there be some kind of cooperation in the future?> <How is the EU/IDEA currently involved in the Botswana Ministry of Agriculture initiative and will there be some kind of cooperation in the future?> here be some kind of cooperation in the future?>

TechTip: InfoToons

When it comes to managing livestock, many potentially valuable practical tips and tricks tend to be buried in professional literature. Getting this information across to smallholder farmers, many of whom are illiterate, remains one of the major stumbling blocks to the development of the agricultural sector in South Africa. The Agricultural Resource Council (ARC) has found an ingenious way to overcome their clients' reading difficulties – 'Infotoons', or information cartoons. The Infotoons convey basic agricultural principles and offer guidelines for farmers, novices and children with different reading abilities. The strips are available in various formats: on CD-ROM, which also offers additional information on crop and livestock production for commercial farmers, in book form, and on the ARC website (*www.arc.agric.za/main/emerging/webpages/*). The Infotoons are crisp and straightforward, explaining one subject at a time. Small livestock farmers can learn how to prepare fresh goat's milk, for example, or how to slaughter their animals for meat. Other topics covered by the 40 Infotoons include chicken farming, the lifecycle of the beef tapeworm and the danger of rabies.

For further information, visit *www.arc.agric.za/main/infotoonadvert.htm*

LITS: tracking Botswana's livestock using radio waves

Tinus Burger describes the LITS project in Botswana, which has installed radio frequency identification technology to identify and monitor millions of beef cattle destined for export to Europe.

ICTs can now be found in the most unlikely places. In Botswana's southern Kweneng and Kgatleng districts, they are even to be found in the stomachs of more than 135,000 cattle.

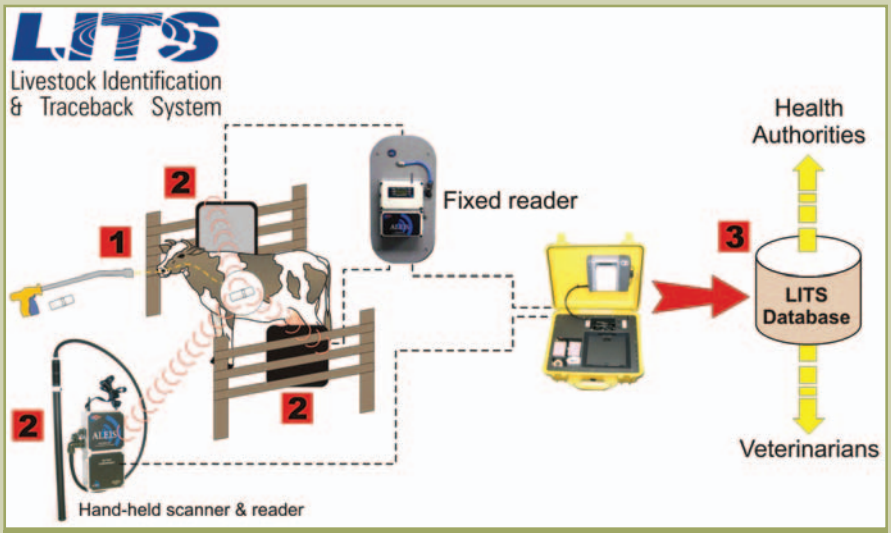
The cattle are participants in an initiative of the Ministry of Agriculture called the Livestock Identification Trace-back System (LITS), which aims to ensure that cattle in Botswana can be individually identified and traced throughout their lives. The system has been introduced to enable Botswana to comply with new regulatory procedures required by the European Union, which accounts for 80 to 90% of Botswana's beef exports. The regulations, imposed following the outbreaks of foot and mouth disease in Europe, stipulate that all imports of deboned beef must be traceable from the packing plant back to the individual animals and farms in the country of origin. For this, exporting countries must set up and maintain a database on the production, distribution, processing and sale of meat products.

LITS employs radio frequency identification (RFID) technology to capture data on individual cattle, which is transmitted directly, error-free, to a central database. The database enables Botswana's meat export agency to obtain EU certification for its beef exports (see elsewhere in this issue), and is a key repository of information for livestock farmers, as well as for state veterinary services and health authorities.

LITS is being implemented by AST Botswana and Inala Identification and Control (South Africa). The first phase, completed in 2001, involved the development of the database and the identification of all cattle in two pilot districts. In the second phase the system is being extended, and will eventually be the world's largest livestock tracking, monitoring and management system using RFID technology, involving an estimated 3 million head of cattle.

RFID technology

At the core of the system is a bolus containing a transponder that is, with the aid of an applicator, inserted into each animal's rumen. Each bolus carries a unique ID number and other data that can be read by fixed or portable readers and relayed to the database. Fixed readers, placed at over 300 strategic locations, scan the ID numbers and relay information on, for example, new registrations and disease treatments to 46 district offices. Extension officers are equipped with hand-held readers that allow them to collect data on cattle in their 'crushes' or kraals.



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The convenience, speed and accuracy of the LITS system have brought many benefits for Botswana's livestock farmers, veterinary officers and health authorities. It can be used to locate lost or stolen cattle, and to monitor and manage disease outbreaks. The stomach bolus is safe for the animals, there are few field losses, criminal tampering is not possible, and it is easy to read because it is always in the same place. Also, the bolus is retrieved at the slaughterhouse and can be recycled, keeping costs low. It is a vast improvement on passive livestock identification systems such as ear tags, which require animals to be checked manually until the correct one is found. Locating a dozen cattle that require treatment from a herd of 200 used to be very time consuming. Now, all the animals simply file between two RFID readers, and a control gate automatically guides the required cattle into an isolation pen.

New ways of working

LITS has encouraged everyone involved in livestock management to be more thorough and to be creative in finding new ways of working and monitoring performance. Veterinary officers, for example, can now:

- rapidly isolate animals for treatment, and update health records at the point of treatment;
- track weight gain in selected animals;
- correlate feeding programmes with yield;
- select specific bulls for breeding programmes; and
- track animal family trees.

Livestock are not only valuable assets, they are also the start of a food supply chain with serious consequences in terms of health and profitability if the risks are not properly managed. RFID technology can make a significant contribution to the auditing of livestock lifecycles for many purposes, ranging from improving yield and optimizing feeding regimes, to ensuring conformance with EU regulations.

The LITS initiative has demonstrated the direct and immediate benefits that can be achieved through the application of established and emerging technologies. In Botswana the system is helping to ensure the long-term security of its beef export market and offers an additional marketing edge, enabling the country to compete worldwide for new export orders. The same principles are now being used to assist sheep and ostrich farmers in South Africa.

Tinus Burger (email: *tinus@inala.co.za*) is a member of the LITS implementation team. For more information, visit *www.gov.bw/government/ministry_of_agriculture.html#animal_health_and_production*

The Indian milk collection centre: a one-stop shop

T.P. Rama Rao explains how an ingenious computer system is helping Indian farmers to improve their dairy herds and the quality and quantity of their milk.

Twice a day, dairy farmers in the Kheda district of Gujarat, India, visit one of the district's 600 village dairy cooperative societies to sell their milk at a one-stop dairy shop – an innovative IT-supported milk collection system, comprising a weighing scale, a fat-content testing device and a mechanism to calculate the amount payable. In a typical transaction, the farmer pours the milk into a steel trough, the milk is weighed, and a sample is taken to check the fat content. The farmer then inserts a plastic identity card, or smart card, with a unique code into a reader that is connected to a computer. The PC calculates and prints outs a payment slip, which the farmer presents to the cashier for payment. The whole process takes just a few minutes.

The one-stop shop approach is an initiative of the National Dairy Development Board (NDDB) to meet the growing national demand for milk, one of the main sources of protein and calcium for the largely vegetarian population. The NDDB has launched a programme to double the amount of milk collected in the next six years, and to improve the production, processing and marketing of milk and milk products.

The computerized system has successfully replaced the inaccurate and inefficient traditional methods of milk collection, where the fat content testing and payment were separate processes. In most cases, it took hours to calculate fat content, and farmers were only paid every ten days. In contrast, the one-stop dairy shop enables accurate and immediate payment, and saves time for everyone involved – the farmers, the cooperative societies, and the state. The net result has been a dramatic increase in efficiency and productivity. There are now 2500 one-stop shops, which receive milk from 400,000 farmers daily. With about 70,000 village cooperative societies throughout India, the potential to improve the performance of the dairy sector nationwide is truly staggering. The system has already brought many benefits, including the elimination of fraud, improved financial accounting and thus greater transparency, as well as generating employment in rural areas.

DISK

The automation of the milk collection process is only the first step in changing the dairy cooperative societies into full-fledged information and marketing hubs for farming communities. The next step is the development and implementation of the Dairy Information Services Kiosk (DISK), a system that will offer additional information services for the members of the dairy cooperative societies. Developed by the Centre for eGovernance at the Indian Institute of Management, Ahmedabad (CEG-IIMA) and the AMUL dairy cooperative in Kaira, DISK builds on the existing PC-based milk collection and billing systems and includes a wide range of software and multimedia applications. DISK will enable dairy farmers to receive payment slips containing information on the quality of their milk, the health status of their dairy cattle, and the availability of services such as artificial insemination, veterinary advice, cattle feed suppliers, etc.

The CEG-IIMA has also developed a Dairy Portal (*http://202.41.76.161:8080/html/*), an online interface between the cooperative societies and village farmers. This pilot website contains technical information and multimedia content in Gujarati and English for farmers, extension workers and researchers on modern dairying and related practices. The portal could also include an e-banking module, enabling the milk payments to be made directly into a farmer's bank account, access to insurance and loan facilities, price information and an online livestock market. The above features were implemented in an experiment which was partially successful. Further work is needed on the development of the portal and on selling the concept to the dairy cooperative societies.

Professor T.P. Rama Rao (email: *ramarao@iimahd.ernet.in*) is CEG-IIMA's coordinator. For further information about DISK, visit *www.iimahd.ernet.in/egov/disk.htm*.

A dairy farmer inspects her milk payment slip (left), which was calculated and printed out in a matter of minutes by a PC workstation at her local dairy cooperative society (right). Photos: AKASHGANGA

The Cyber Shepherds: monitoring livestock in the Sahel

How can pastoralists be helped to improve their livestock management practices and to protect pastures threatened by drought and overgrazing? Alioune Kâ describes a potential solution.

The sparsely populated Sahel, which covers roughly the same area as the continental United States, may seem like the last place for ICTs to take root. Yet the region is home to the Cyber Shepherds – livestock herders who are using GIS-based maps, global positioning system (GPS) devices, mobile phones and the web to help them manage their flocks and herds.

The Sahel has long been affected by climatic changes, which force pastoralists and their livestock to be constantly on the move. During the eight-month dry season they travel south in search of fresh pastures and water supplies, and back again, in a cyclical, seasonal journey known as transhumance. The changing rainfall patterns mean that the region's livestock sector is extremely vulnerable to the shrinking vegetation cover and increasing soil degradation. The movement of herds also frequently leads to conflicts among the migrant herders and with sedentary farmers in the more fertile south. Sustainable resource management therefore involves addressing environmental issues, and both could benefit from technological support to pastoralist communities on local, national and subregional scales.

The IDRC-sponsored project 'sustainable management of pastoral resources in the Sahel', also referred to as the Cyber Shepherd initiative, was set up in 2001 by the Ecole inter-Etats des sciences et médecine vétérinaire (EISMV) and Centre de suivi ecologique (CSE) in Dakar, Senegal. The aim of the project is to enable Sahelian pastoralists to access accurate information on grazing lands in order to help them coordinate their movements and protect land and water resources during the dry season. Project members are working closely with grassroots communities to identify innovative ways in which ICTs can be used to harness their traditional knowledge and know-how of natural resource management.

Pastoralists in Senegal can now track their herds using a mobile phone and GPS.
IDRC Photo: Djibril Sy

Methodological approach

The first phase of the programme focused on compiling and assessing local knowledge and practices in key pastoral units (PUs) in Burkina Faso, Mali and Senegal, and on developing a range of ICT applications that would assist pastoralists in locating available grazing lands during the dry season.

GIS-based thematic maps of seasonal movements of livestock in the PUs have been created in the local language in cooperation with local pastoral groups, who help to define land boundaries, identify grazing lands and assign the symbols to be used in the maps. This participatory approach has been adopted to ensure that the maps are transparent and accessible to local communities.

In each pastoral unit, herders have been taught to read and to prepare geographic maps using GPS devices. These are valuable tools for monitoring the movements of herds, and for accurately pinpointing outbreaks of livestock diseases and bush fires. They also provide an efficient means of compiling inventories of water and other resources.

Several herders have been equipped with mobile phones to speed up the exchange of information and provide them with early warning of impending disasters. Some have received IT training so that they can access information on the web. Computers with Internet connections have been installed in each pastoral unit, where real-time information can be accessed through a website set up for them in July 2003. The *Gallé Aynabé* site, nicknamed 'cyber shepherd', offers advice on how to recognize and treat animal diseases, and brings together a wide range of local resource management knowledge and practices that can help pastoralists, such as where to guide their herds and how to resolve land use conflicts. As part of an experiment in the PUs of Thiel, Tessékéré and Kouthiaba in Senegal, maps and satellite images have been posted on the site to help monitor and evaluate the use of pastures in each unit. Pastoralists can now obtain real-time information on the status of grazing areas and their 'carrying capacity' – the number of animals that can be pastured there during the dry season without risk to the environment and its resources.

In practice, the project is facing many problems that are all too common when introducing new technologies for use in rural areas. Most local people cannot read or write, or are literate only in the local language. Sometimes connections fail because the network is down, or the power supply is out (most devices are solar powered), and the equipment is not always well maintained. These concerns will be addressed in the project's second phase, perhaps using simpler tools and means.

The complex, ever-changing nature of resource management in the Sahel means that local pastoralist communities need up-to-date information on pastures, as well as the means to evaluate this information. The Cyber Shepherd project has made this both technically and financially possible, and is clearly demonstrating the added value of ICTs in the practical implementation of pastoral development policy, and in helping to address the needs of the millions of pastoralists in the Sahel.

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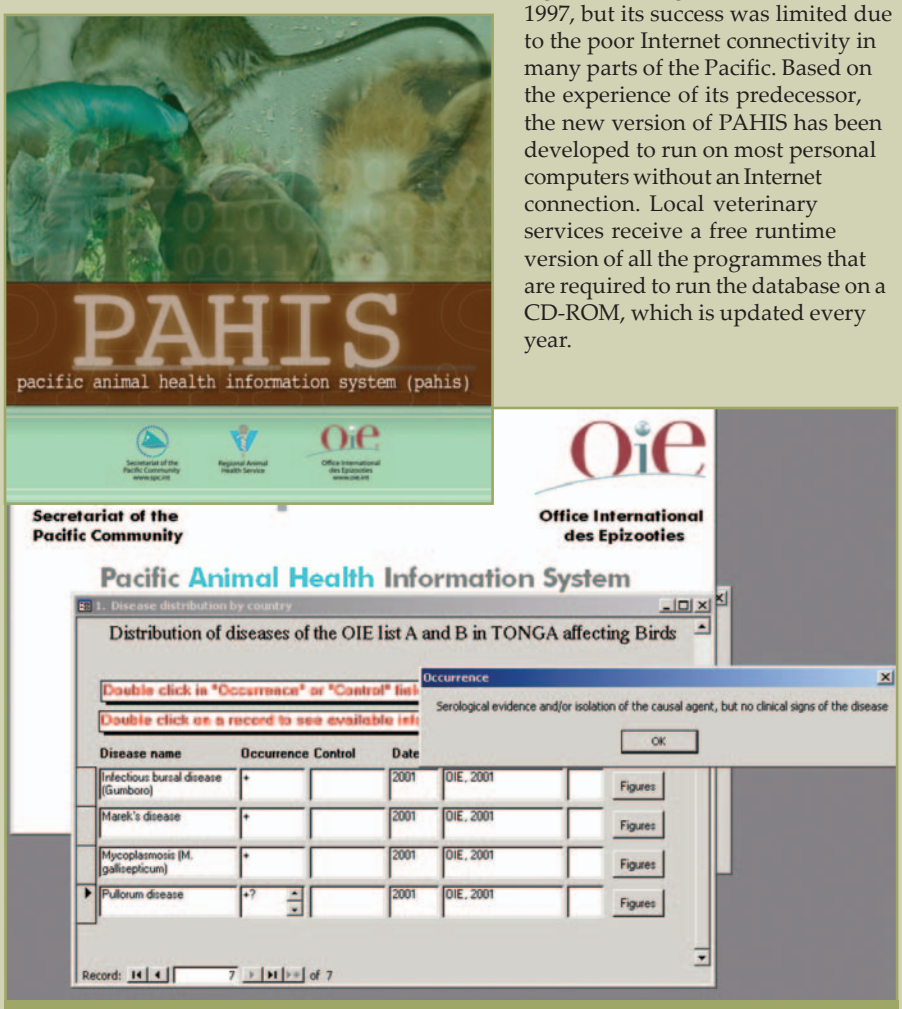
PAHIS: the Pacific animal health information system

Alexandre Fediaevsky reports on a new database and decision support system that allows veterinary officers in the Pacific region easy access to vital information.

Sina Taulealo, a veterinary officer in Samoa, only needs a simple CD-ROM to access comprehensive information on, for example, the distribution of the fowl pox virus throughout the Pacific Island Countries and Territories, and to perform an accurate risk analysis for his region. At the touch of a button, he can retrieve technical information on the virus, run an analysis on susceptible livestock species, and find the contact details of professional colleagues on other islands who have experience in dealing with the disease.

The above scenario is the result of efforts by the Secretariat of the Pacific Community Regional Animal Health Service (SPC RAHS), which was established in 1991 to support the region's veterinary services. On many Pacific islands these services face a number of constraints such as the lack of access to professional literature and up-to-date information on international animal health standards, and unreliable or unreferenced data. Such information is necessary to carry out risk analyses, make quarantine decisions or conduct investigations of suspected disease outbreaks. The situation is exacerbated by poor communications infrastructures, and the lack of laboratory diagnostic capabilities or limited access to such facilities. To remedy these problems, the RAHS, in collaboration with the Office International des Epizooties (OIE), has developed the Pacific Animal Health Information System (PAHIS) database, which is now available on CD-ROM.

The PAHIS database was initially developed as a web-based tool in collaboration with the Food and Agriculture Organization (FAO) in 1997, but its success was limited due to the poor Internet connectivity in many parts of the Pacific. Based on the experience of its predecessor, the new version of PAHIS has been developed to run on most personal computers without an Internet connection. Local veterinary services receive a free runtime version of all the programmes that are required to run the database on a CD-ROM, which is updated every year.



PAHIS users can search the PAHIS database for information on animal disease distributions in the Pacific region using multiple criteria such as disease names, geographic coverage and susceptible species.

The PAHIS CD-ROM contains a wide range of information, including country reports, contact details, livestock populations by country and by species, and the veterinary facilities and infrastructures in Pacific countries. It also contains updated information on the distribution of animal diseases, based on data from the OIE's *World Animal Health* yearbook, and from disease surveys and animal health status reports.

Users can search the PAHIS database for information on animal disease distributions in the Pacific region using multiple criteria such as disease names, geographic coverage, susceptible species, and categories of commodities such as meat, milk, semen that may be responsible for spreading pathogens. To address the specific requirements of officials who need to carry out import risk analyses and make quarantine decisions, comparisons of the disease status of countries are also available. The results are displayed in tables and maps that can be easily incorporated into reports.

But PAHIS is more than a simple database. It also includes technical documents and international standards such as the OIE international animal health codes, manuals for the recognition of exotic livestock diseases, diagnostics and vaccines, and disease recognition cards. The information provided by PAHIS can also assist veterinary services and other government agencies in taking the most appropriate decisions to protect their animal populations from exotic diseases.

The new version of PAHIS was officially launched at the 23rd Conference of the OIE Regional Commission for Asia, the Far East and Oceania on 26–29 November 2003. During that conference, PAHIS was demonstrated to delegates from the SPC member countries with veterinary services: American Samoa, Fiji, French Polynesia, New Caledonia, Northern Marianas, Papua New Guinea, Samoa, Tonga and Vanuatu.

The PAHIS CD-ROM has been designed as a tool to assist the veterinary services of the Pacific region, or those who carry similar responsibilities for their local authorities. For the general public a limited version of PAHIS is available on the SPC website.

Alexandre Fediaevsky (email: *AlexandreF@spc.int*) is an animal health information specialist at the SPC. For more information, visit *www.spc.int/rahs/*.

Projects and initiatives

This section lists key projects and initiatives in the field of livestock and ICTs.
Additional information is available from the web magazine at *http://ictupdate.cta.int*.

AFRICA

ALIN-EA has teamed up with scientists from the **LEWS/Global Livestock Collaborative Research Support Program (CRSP)** at Texas A&M University and the ASARECA Animal Agriculture research Network (A-AARNET) to develop a **Livestock Early Warning System (LEWS)** for the region. The project is a synergistic mix of low-tech and high-tech to meet the information needs of the countries in the Greater Horn of Africa. ALIN will assist scientists broadcast outputs and advisories from their forage and livestock monitoring models to ensure they reach those who need it in remote regions. The Center for Natural Resource Information Technology (CNRIT) at Texas A&M has agreed to host the real-time computer analysis and provide information on forage status to ALIN for distribution on the WorldSpace radio systems. ALIN will disseminate drought early warning reports for isolated rural communities in Ethiopia, Kenya, Tanzania, and Uganda.
www.alin.or.ke/data/partners.htm and *http://cnrit.tamu.edu/aflews/*

The **Regional Animal Disease Surveillance and Control Network (RADISCON)** seeks to develop an Animal Disease Surveillance and Control Network by strengthening veterinary investigation, animal disease information and laboratory services, continued professional development and improved communication between neighbouring countries. RADISCON is a joint FAO/IFAD endeavour targeted at 29 nations in North Africa, the Sahel, the Horn of Africa, the Middle East and the Arab Peninsula.
www.fao.org/ag/aga/agah/id/radiscon

The **International Trypanotolerance Centre (ITC)**, located in Banjul, The Gambia, carries out research on trypanotolerance in indigenous breeds of domestic animals in the humid and subhumid zones of West Africa. It examines all aspects of livestock production and utilization through the wider and better use of disease-resistant indigenous breeds of cattle, sheep and goats. The Centre, which serves the NARS throughout the region, carries out R&D to exploit the genetic resistance and adaptability of indigenous livestock resources. To support this work, ITC's **Biostatistics unit** is equipped with statistical software packages (SAS, SPSS, LASER, Epi-info, Statgraphics, etc.), and the **GIS department** provides services such as analysis and mapping of spatial-temporal relationships in production and disease investigations.
www.itc.gm/html/aboutus.html

Tanzania: The **Kasulu Internet Project** in Mtabila refugee camp is enabling rural refugees to learn about computers and the Internet. The project is fuelled by a rather unusual power source – the Community Internet Centre at Mtabila uses cow manure to provide electricity for its handful of machines. The project offers training in computer skills, as well as access to the Internet and email, for some of the most deprived people in Africa. The aim is to teach computer skills to refugees who have known little else but civil war and genocide, before they return home to Burundi. The Mtabila project is funded by the Global Catalyst Fund, an organisation that promotes development through advances in technology. *www.news.bbc.co.uk/2/hi/technology/2957488.stm*

CARIBBEAN

The **Caribbean Animal and Plant Health Information Network (CARAPHIN)** is the most important research body for livestock management in the Caribbean. Of particular interest is its email newsletter and animal health and disease database.
http://infoagro.net/health/caraphin/

ASIA & THE PACIFIC

The **Forages for Smallholders Project (FSP)** is jointly coordinated by the **International Centre for Tropical Agriculture (CIAT)** and the **Commonwealth Scientific and Industrial Research Organisation (CSIRO)** of Australia. The national partners in Indonesia, Laos, Philippines, Thailand and Vietnam have used participatory research approaches with farmers to design, develop, and test forage systems with grasses and legumes identified by the project. To support such projects, CIAT's interdisciplinary team is developing improved methods for targeting forage germplasm in hillside environments, using geographical information systems (GIS).
www.ciat.cgiar.org/ciatinfocus/forages.htm

GLOBAL

The **FAO Animal Production and Health Division** website (*www.fao.org/ag/againfo/programmes/en/aga_prog.html*) is by far the most comprehensive online source of information on all aspects of livestock management in ACP countries, and should be the first port of call for anyone interested in the subject. Among its many ICT-based information resources are the following:

The **Global Livestock Information System and Knowledge Framework** intends to develop and maintain a comprehensive information system and knowledge framework on animal agriculture with the aim of improving livestock policy decision-making at various levels. In particular, the programme will compile, generate and extrapolate relevant information through the application of GIS, remote sensing and modelling techniques.
www.fao.org/ag/againfo/programmes/en/P1.html

The **Programme against African Trypanosomiasis Information System (PAAT-IS)** provides strategic decision support on tsetse and trypanosomiasis control in sub-Saharan Africa. The system consists of three interacting components. The geographical information system (GIS) provides the capability for storage, display and analysis of layers of spatial data; the resource inventory contains country level tsetse and trypanosomiasis information; and the knowledge base allows users to query an extensive database. *www.fao.org/ag/againfo/programmes/en/paat/infosys.html*

The **Livestock, Environment and Development (LEAD) initiative** is an inter-institutional project hosted by FAO. Livestock, environment and trade considerations are likely to become more prominent in international and bilateral trade agreements as a result of the growing demand for livestock products, the intensification of production, and increasing trade liberalization. The portal site includes online discussion forums, newsletters and conferences. *www.lead.virtualcentre.org/en/frame.htm*

The **International Livestock Research Institute (ILRI)**, based in Nairobi, helps the world's poor people build and protect their livestock-based assets so that these, not poverty, are passed on to the next generation. ILRI's library has built up a unique collection on animal production and diseases, non-conventional literature on animal agriculture and other information resources from research centres in 27 sub-Saharan African countries, which are available either on CD-ROM or through its extensive online databases.
www.ilri.org

Q&A: ICTs and livestock performance

South Africa's **ARC Animal Improvement Institute (ARC-AII)** is working to improve the biological and economic efficiency of animals through scientific research, development, evaluation and technology transfer. Deputy Director **Dr Japie van der Westhuizen** explains how ICTs are becoming an integral part of the institute's activities and, thus, the national livestock sector.

What is the role of the ARC-AII in livestock management?
The ARC-AII's two key responsibilities are to carry out national research and development (R&D) in the field of livestock productivity, and to manage the National Livestock Recording and Improvement Schemes. Our activities put researchers and other institute personnel in direct contact with livestock farmers, industry and policy makers. We assess the needs of all livestock farmers, and develop products that will address those needs.

What is the role of ICTs in livestock management and ARC-AII activities?
In Africa, ICTs have become important tools for recording livestock performance and production levels. Many commercial farmers run PC-based recording and management software that turns raw performance data into information that can be used immediately at the local farm level. In many countries ICTs do not go beyond this level, but in South Africa most local livestock data is fed into the centralized Integrated Registration and Genetic Information System (INTERGIS). INTERGIS is managed by the ARC-AII as part of the National Recording and Improvement Schemes. The system sets national livestock productivity benchmarks, enables comparisons of all animals in terms of genetic potential, and provides policymakers and farmers with a reliable source of reference. INTERGIS therefore plays a pivotal role in keeping South Africa's livestock producers globally competitive.

INTERGIS contains productivity and performance data for beef cattle, dairy animals, small stock, pigs and poultry. Farmers or ARC-AII personnel record the data electronically at farm level using a PC or Palmtop and free software that allows them to directly transfer the data to INGERGIS.

What are the challenges the ARC-AII faces in applying ICTs?

The ARC-AII supplies ultrasonic scanners that capture digital images for the evaluation of, among other things, backfat and muscle tissue (left) and electronic scales which enable farmers to weigh their cattle with great precision (below).

Our biggest challenge is to expand the number of farm units with performance recording capabilities while maintaining our high levels of service for existing programme participants. Another challenge lies in maintaining the fine balance that exists between our R&D and technology transfer activities and the ICT skills and needs of livestock producers in South Africa. When developing applications that make livestock management practices more efficient and less time-consuming, our scientists always have to keep in mind that the majority of end-users will not be computer or ICT-literate.

What are the most promising developments in the field of ICTs and livestock management?
Advances in Palmtop technology and electronic reporting in standardized formats like PDF, as well as improved access to the web and thin client technology, are having a major impact on the uptake of livestock recording. Thin client technology, or server-based computing, enables users to access and use applications like word processing and spreadsheets over the Internet without having to install the software on their own computer. Another important development has been the rise of open source technology, which makes many ICT applications more affordable and is allowing Africans to develop and maintain their own ICT capacities. Many ARC-AII initiatives are based on open source technology – all our genetic evaluations as well as our pig recording and improvement database and web systems run on Linux. Also, investments in additional infrastructure, and mobile phone networks in particular, will allow livestock farmers and businesses in rural areas to gain faster and more efficient access to resources that could improve their livelihoods.

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